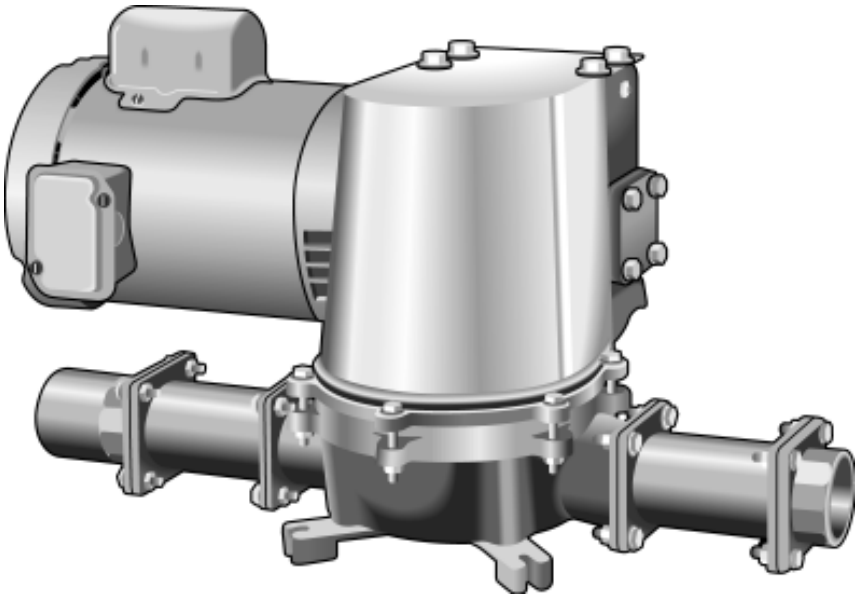
M-Series Vacuum Pump

OWNER'S MANUAL



SeaLand® BRAND

Dometic®

Dometic Corporation
13128 State Rt 226, P.O. Box 38
Big Prairie, Ohio 44611-0038 USA
SeaLand Product Hotline 1-800-321-9886
(8:00 a.m. - 5:00 p.m. ET)

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SAFETY INSTRUCTIONS

WARNING: When using this product, always exercise basic safety precautions including the following:

- Read all instructions before use or installation.
- Never connect this product to any electrical circuit other than the specified voltage, and never exceed the amperage draw specified in "Electrical Wiring" on page 3.
- Never install, use or service any component of this device in an atmosphere with potentially flammable or explosive vapors unless specified for explosion-proof atmospheres.

NOTE: EXPLOSION-PROOF COMPONENTS MUST BE WIRED TO NEC CLASS 1, DIV. 2, GROUP D REQUIREMENTS.

MODELS

PART NUMBER	VOLTAGE	HORSEPOWER
501200	12VDC	1/2
502400	24VDC	1/2
503200	32VDC	1/2
511500	115/230VAC	1/2

Also available with optional 3/4 horsepower, explosion-proof and 50 cycle motors.

INSTALLATION INSTRUCTIONS

Preparation

1. **Note: Motor is shipped separately in its own carton.** Remove motor from carton.
2. Verify that motor shaft key, mounting bolts, and lock washers are included.
3. Be sure motor shaft is clean and free of dirt. Remove any "burrs" that may be present in the keyway of motor shaft.
4. Remove pump from shipping carton.
5. **Do not** clean grease from the inside of the input shaft of the gear reducer.
6. Insert key in motor shaft keyway. Align motor shaft key with keyway in gear reducer input shaft.
7. Insert motor shaft until motor fits against flange on gear reducer. Align four (4) clearance holes in the flange with the four (4) threaded holes in the motor.
8. Secure the motor to the gear reducer using the four (4) 3/8"-16 x 1" hex head screws and lock washers supplied with the pump.

Mounting the Pump

1. Remove shipping platform from bottom of pump.
2. Set pump in position with inlet and outlet pointing in direction of flow.
3. Secure pump to mounting surface using 1/4" (6mm) diameter or larger fasteners.

NOTE: Due to the unbalanced weight of the pump, it is important that adequate fastener size be used to secure the pump.

Electrical Wiring

It is imperative that adequate wire size and proper over-current protection (fuse or circuit breaker) sizes are used. The following chart can be used as a guideline. Refer to chart on page 10 for solenoid/relay information.

PUMP VOLTAGE	PUMP MOTOR WIRE SIZE		BREAKER/FUSE SIZE	
	1/2 HP	3/4 HP	1/2 HP	3/4 HP
12 VDC	6 to 8 ga.	3 to 4 ga.	50 amp	75 amp
24 VDC	8 to 10 ga.	6 to 8 ga.	25 amp	40 amp
32 VDC	10 to 12 ga.	8 to 10 ga.	20 amp	30 amp
115 VAC (1 phase)	12 to 14 ga.	10 to 12 ga.	10 amp	15 amp
230 VAC (1 phase)	14 to 16 ga.	12 to 14 ga.	5 amp	8 amp

MAINTENANCE

ELECTRICAL CAUTION: DISCONNECT POWER SUPPLY TO PUMP BEFORE SERVICING UNIT. FOLLOW PROPER LOCK-OUT/TAG-OUT PROCEDURES.

Maintenance intervals and normal parts replacement vary widely depending on numerous factors such as frequency of system use and quality of flush water, etc. The chart below is intended strictly as a general guideline. Owner discretion and consideration of actual usage must be the first basis for determining proper maintenance levels.

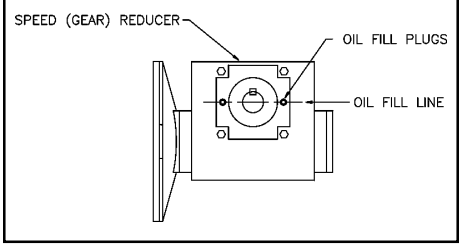
Maintenance Procedure	Procedure	Approximate Maintenance Level
Change Oil	A	See instructions
Inspect Diaphragm	B	Every two years
Inspect Rod Bushing	C	Every two years
Inspect Eccentric Pin	D	Every two years
Duckbill Valve Replacement	E	Every two years
Speed Reducer Replacement	F	If needed
Motor Replacement	G	If needed

A. CHANGE OIL

WARNING
Pump starts automatically. Turn off power before servicing.

The gear reducer oil should be changed after first 50 hours, thereafter every 200 hours. Drain and fill with 90W oil or equivalent to bottom of oil level inspection hole (opposite of output shaft). Grease the rod bushing every 200 hours. (See item 9 on Pump Parts List)

Fig. 1



B. DIAPHRAGM REPLACEMENT

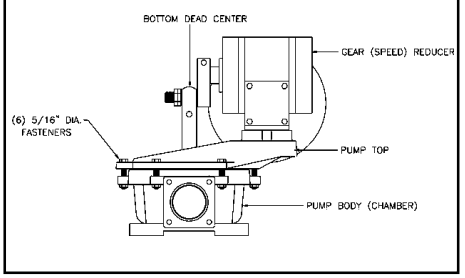
WARNING
Pump starts automatically. Turn off power before servicing.

CAUTION: KEEP HANDS AND ALL OTHER EXTREMITIES AWAY FROM ROD AND DIAPHRAGM. FLUSH THE PUMP WITH CLEAN WATER AND DISINFECTANT BEFORE SERVICING.

When replacing a diaphragm, be sure to follow maintenance instructions B-D.

IMPORTANT: Incorrect alignments and clearances may cause premature diaphragm failure. It is important to insure that proper alignment is achieved between the eccentric pin and the diaphragm rod. Make sure that clearances are correct between the diaphragm rod and the eccentric (Fig. 6) and also between the eccentric and the gear reducer hub (Fig. 7).

Fig. 2



To Remove the Diaphragm:

1. Remove pump cover (not used in SaniService applications).
2. Jog motor until rod is at bottom dead center position.
   NOTE: See manual rotation method on page 4.
3. Close the maintenance valves (if installed) in the inlet and outlet piping.

4. Disconnect electrical source to motor, following lock-out/tag-out procedure.
5. Remove the six (6) 5/16" fasteners around the circumference of the pump top.
6. Carefully remove the pump top from the pump body.
7. Turn the pump top upside down to expose the diaphragm and rod bolt. (See Fig. 3)
8. Remove the rod bolt.
9. Pull the diaphragm away from the rod.
10. Clean the old silicone adhesive from the top and bottom diaphragm plate and bottom of the rod.
11. Clean the old grease (if any) from the diaphragm sealing groove in the pump body.

To Install the Diaphragm:

1. Apply bead of silicone adhesive around the rod bolt hole on both sides of the diaphragm and let cure until the silicone skins over.
2. Assemble the diaphragm, upper and lower plates to the rod.
3. Apply silicone grease to the diaphragm sealing groove in the pump body.
4. Carefully install the pump top and diaphragm into the pump body. Make certain the diaphragm is properly seated in the groove in the pump body.
5. Tighten the six (6) 5/16" mounting bolts in a criss-cross pattern as shown. (See Fig. 4)

Fig. 3

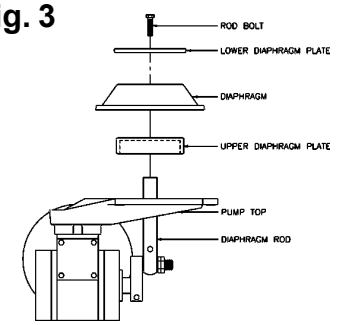
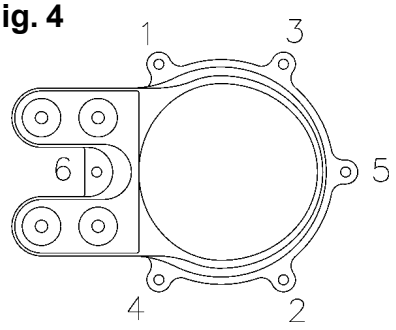


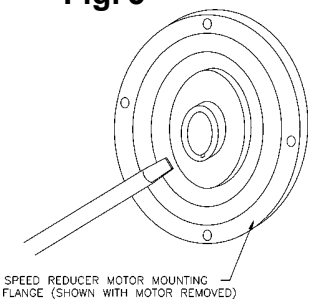
Fig. 4



Manual Rotation Method:

1. Remove motor from speed (gear) reducer.
2. Wedge a large flat-bladed screwdriver or pry bar into hollow input shaft keyway of speed reducer and rotate until rod is at bottom dead center. (See Fig. 5)

Fig. 5



C. ROD BUSHING INSPECTION AND REPLACEMENT

WARNING
Pump starts automatically. Turn off power before servicing.

NOTE: The rod and bearing must be replaced as an assembly because the bearing is pressed into the rod using special equipment.

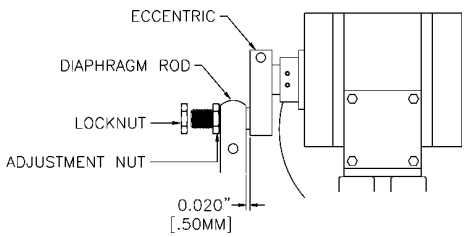
To Inspect:

1. Follow steps 1 through 11 in “To Remove the Diaphragm” on page 3.
2. Remove the hex nuts from the eccentric pin and slide off the old rod.
3. Inspect the bushing in the rod for wear by measuring the bushing diameter. If worn beyond the service limits, replace the rod and bushing.
   New: 0.625" [15.88mm]
   Service Limit: 0.630” [16mm]

To Install:

1. Lubricate the bushing and eccentric pin with anti-seize compound.
2. Slide rod onto the eccentric pin. (See Fig. 6)

Fig. 6



3. Install and adjust first hex nut for proper bushing clearance of 0.020" [.50mm].
4. Hold adjustment nut from turning and install and tighten the lock nut.
5. Recheck bushing clearance.

IMPORTANT: INADEQUATE CLEARANCE OR LOOSE LOCK NUT WILL CAUSE THE ECCENTRIC TO BIND, RESULTING IN PUMP STALLING AND PREMATURE BUSHING WEAR.

6. Follow steps 1 through 5 in "To Install the Diaphragm" on page 4.

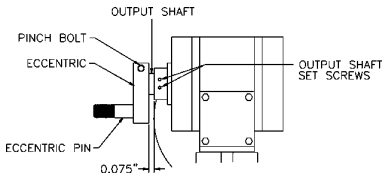
D. ECCENTRIC PIN INSPECTION AND REPLACEMENT

WARNING
Pump starts automatically. Turn off power before servicing.

To Inspect:
1. Follow steps 1 and 2 in the rod bushing inspection and replacement section.
2. Inspect the eccentric pin diameter for wear. If worn beyond the service limit replace the eccentric.
   New: 0.6248" [15.87mm]
   Service Limit: 0.622" [15.80mm]
3. Remove the eccentric by loosening the pinch bolt and jamming a flat-blade screwdriver into the pinch bolt slot.

To Install:
1. Slide the new eccentric onto the output shaft until the output shaft is flush with the end of the eccentric. Make certain the key is in the keyway and flush with the end of the eccentric. (See Fig. 7)
2. Slide eccentric in or out to adjust eccentric to speed (gear) reducer clearance of 0.075" [1.9mm], tighten pinch bolt and check clearance.
3. Follow step 3 (To Inspect) and steps 1 through 6 (To Install) in Rod Bushing Inspection and Replacement section. (See Fig. 7)

Fig. 7



IMPORTANT: IF OUTPUT SHAFT IS NOT FLUSH WITH ECCENTRIC AFTER CLEARANCE, ADJUSTMENT WILL BE NECESSARY. LOOSEN THE OUTPUT SHAFT SET SCREWS AND SLIDE THE OUTPUT SHAFT IN OR OUT ACCORDINGLY.

E. DUCKBILL VALVE INSPECTION AND REPLACEMENT

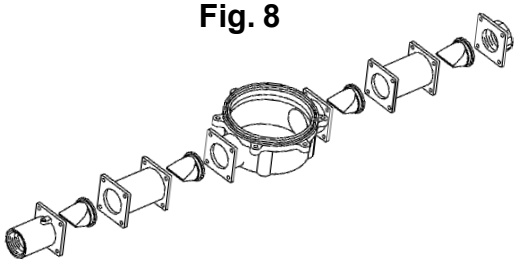
WARNING
Pump starts automatically. Turn off power before servicing.

To Inspect:
1. Flush the pump with fresh water and disinfectant.
2. Close the maintenance valves (if installed) in the inlet and outlet piping.
3. Turn off/disconnect electrical source to the pump motor.
4. Disassemble the inlet/outlet flanges, elbows, and valve housings. (See Fig. 8)
5. Remove the four (4) duckbill valves. Replace all valves if any appear to be: swollen, out of shape, torn, scuffed, slit or show any other sign of wear.

CAUTION: ORDER VALVES MADE OF EPDM (PART NUMBER: 348702) FOR ALL SEWAGE APPLICATIONS. ORDER VALVES MADE OF NITRILE (PART NUMBER: 342684) FOR OIL-CONTAMINATED WATER APPLICATIONS.

To Install:
1. Insert the two inlet valves pointing toward the pump body. (See Fig. 8)
2. Insert the two (2) outlet valves pointing away from the pump body. (See Fig. 8)

Fig. 8

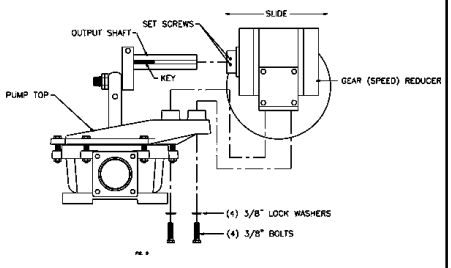


F. SPEED (GEAR) REDUCER REPLACEMENT

WARNING
Pump starts automatically. Turn off power before servicing.

To Remove:
1. Turn off electrical power to pump and remove pump cover (not supplied on some models).
2. Remove the motor from the reducer. (See Section G)
3. Loosen output shaft set screws.
4. Remove the four (4) 3/8" bolts that secure the reducer to the pump top using a 9/16" socket and ratchet.
5. Slide the reducer off the output shaft.

Fig. 9



To Replace:
1. Grease the output shaft, keyway and key.
2. Loosen the output shaft set screws and slide the reducer onto the output shaft.
3. Insert the four (4) 3/8" bolts and lock washers through the pump and into the reducer. Tighten securely.
4. See step 2 (To Install) in “Eccentric Pin Inspection and Replacement” (page 5).

G. MOTOR REPLACEMENT

WARNING
Pump starts automatically. Turn off power before servicing.

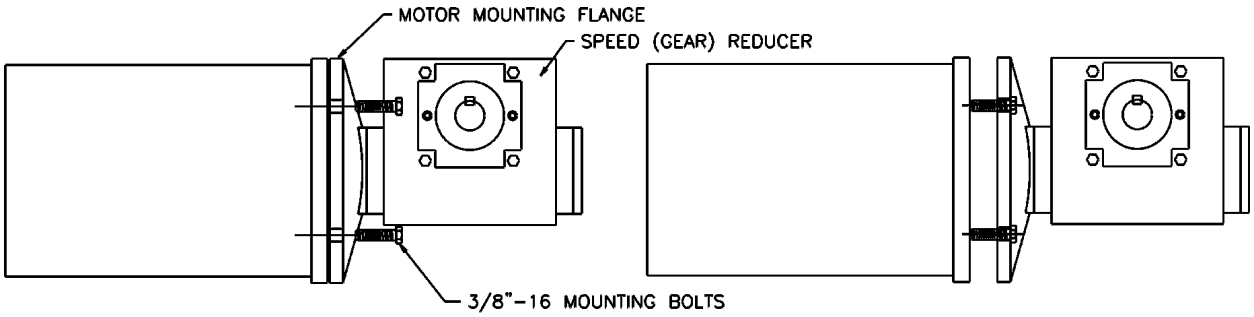
To Remove:
1. Turn off electrical power to pump.
2. Remove access plate from wiring junction box on motor.
3. Unhook wiring from motor leads.
4. Remove the four (4) motor mounting bolts securing the motor to the speed (gear) reducer.
5. Pull the motor away from the gear reducer. (See Fig. 10)

IMPORTANT: OVER TIME THE MOTOR SHAFT MAY SEIZE TO THE SPEED (GEAR) REDUCER SHAFT. IF THIS HAPPENS REFER TO THE NEXT STEP.

6. The speed (gear) reducer motor mounting flange has two threaded holes for forcing the motor off. Use two of the motor mounting bolts for this application. (See Fig. 10)

To Install:
1. Lubricate motor shaft with an anti-seize compound.
2. Insert key into keyway on motor shaft.
3. Carefully slide the motor into the speed (gear) reducer.
4. Install the four bolts and washers and tighten.
5. Wire motor leads to input wires by following instructions on data plate riveted to motor housing.
   Low voltage = 115VAC
   High voltage = 220/230VAC

Fig. 10



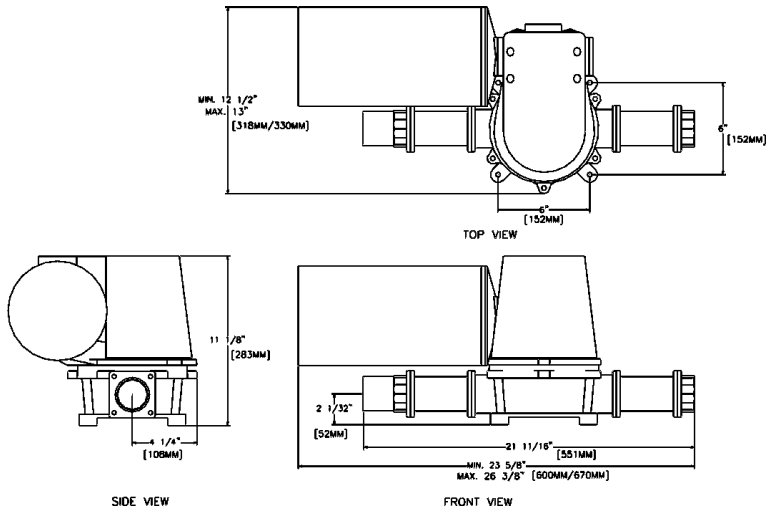
TROUBLESHOOTING

WARNING **Before attempting to open or service the pump:**

1. **If possible, flush pump with clean water and disinfectant.**
2. **Allow motor to cool if overheated.**
3. **Disconnect power supply to pump before servicing unit. Follow proper lock-out/tag-out procedures.**

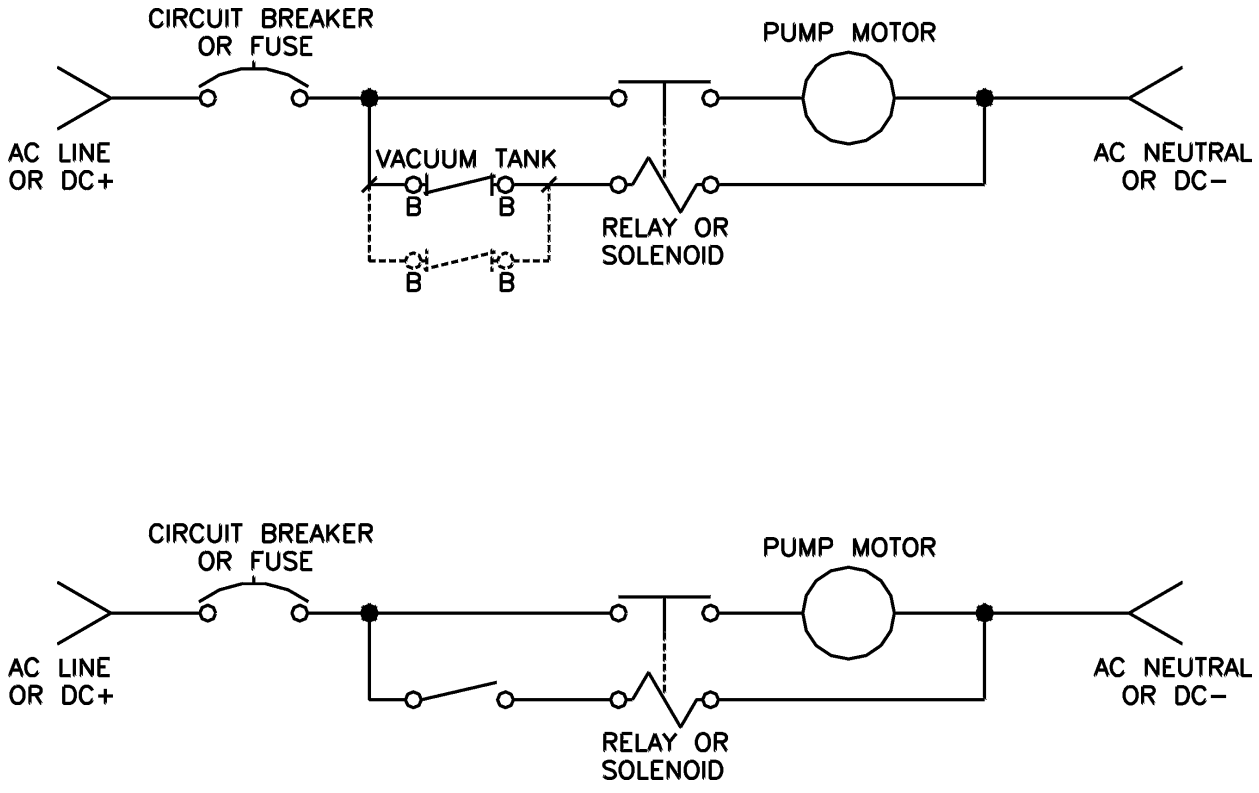
Problem	Possible Cause	Service instructions
1. Pump fails to prime.	a. Air leak(s) in suction (inlet) line.	a. Correct leak.
	b. Suction (inlet) line collapsed.	b. Replace suction line.
	c. Suction (inlet) or discharge (outlet) check valves clogged or worn out.	c. Clean or replace valves (4 required).
	d. Torn or broken diaphragm.	d. Replace diaphragm.
	e. Suction line clogged.	e. Clean suction line.
	f. Diaphragm or flange bolts loose.	f. Tighten bolts.
2. Pump stops or has reduced flow.	a. Air in suction line.	a. Correct leak.
	b. Suction line collapsed.	b. Replace suction line.
	c. Torn or broken diaphragm.	c. Replace diaphragm.
	d. Clogged suction or discharge line.	d. Clean suction or discharge line.
	e. Suction lift or discharge lift (head) too high.	e. Check installation and correct as required.
	f. Suction or discharge valves in pump clogged or defective.	f. Clean or replace valves (4 required).
3. Excessive current draw requires too much power.	a. Liquid solution too thick.	a. Dilute if possible.
	b. Discharge valves in pump clogged.	b. Clean or replace valves (2 required).
	c. Excessive suction or discharge lifts (head).	c. Check installation and correct as required.
4. Excessive noise.	a. Pump, gear reducer or motor loose.	a. Tighten bolts.
	b. Gear reducer low on oil.	b. Check oil level.

DIMENSIONALSPECIFICATIONS



WIRING DIAGRAMS

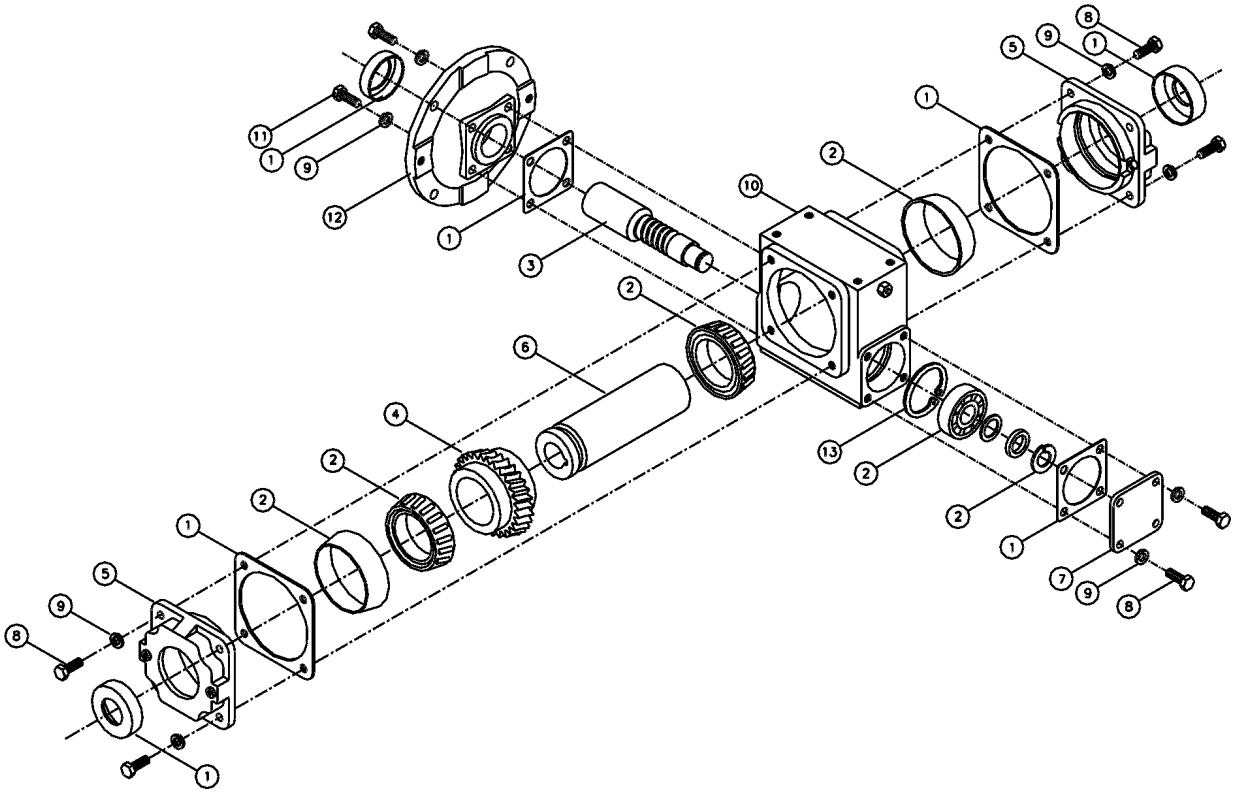
M-Series Vacuum Pump Wiring Schematic
(VacuFlush System)



NOTE: Vacuum tank pressure switches are wired in parallel for multiple toilet installations. Wire to B connections only.

PARTS LIST

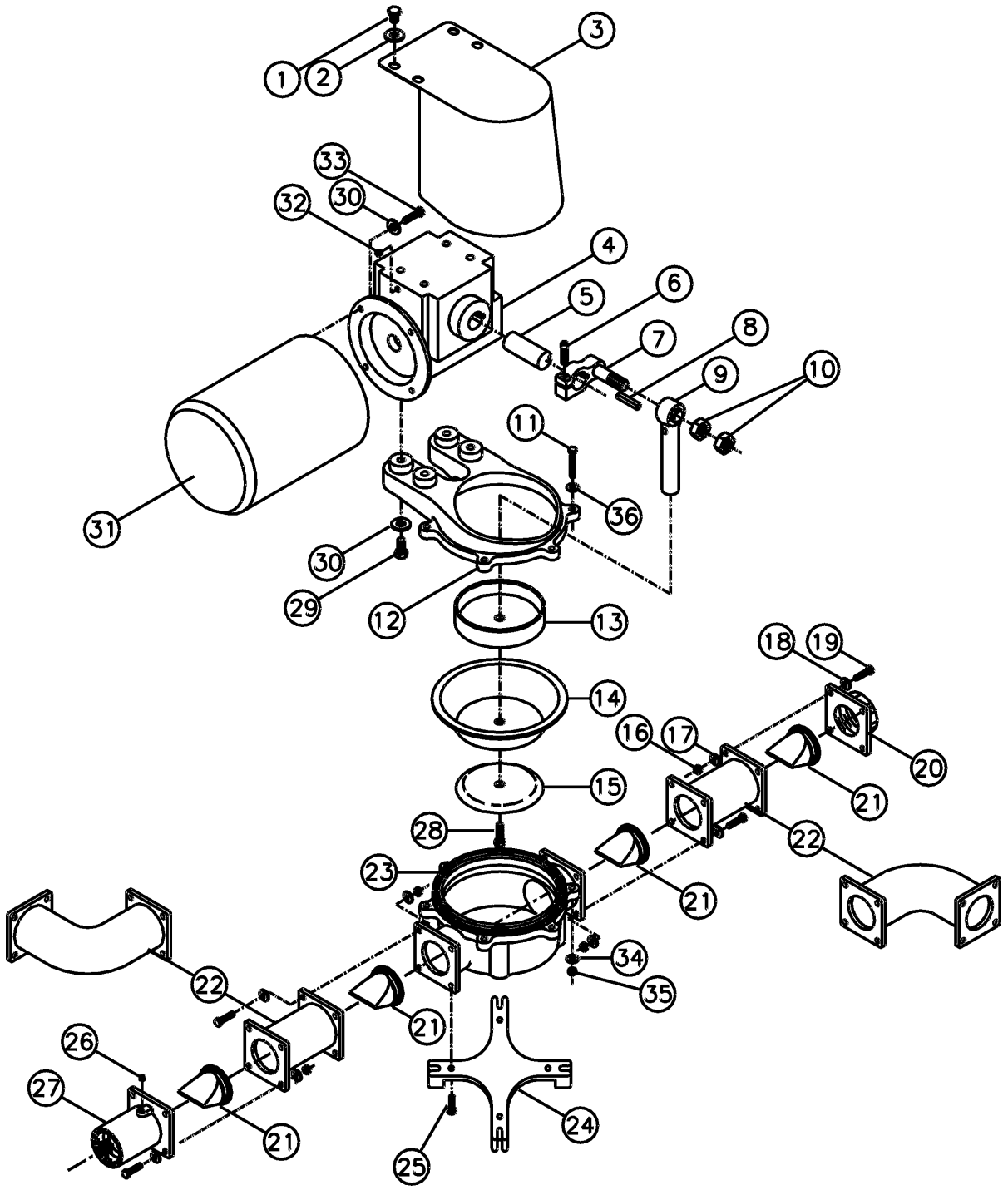
Speed (Gear) Reducer



Item	PART NUMBER *30:1	PART NUMBER *20:1	Description	Qty
1	310537		Seal and Gasket Kit	1
2	310538		Bearing and Race Kit	1
3	342812	342813	Input Shaft 920 MDSN *(SPECIFY RATIO, SERIAL/MODEL NUMBERS TO ORDER)	1
4	342814	342815	Worm Gear 920 MDSN *(SPECIFY RATIO, SERIAL/MODEL NUMBERS TO ORDER)	1
5	342816		Output Shaft Cover (800519)	1
6	342817	342818	Output Shaft *(SPECIFY RATIO, SERIAL/MODEL NUMBERS TO ORDER)	1
7	341792		Input Shaft Cap (800261)	1
8	342820		5/16"-18 x 7/8" Hex Head Screw-SS	12
9	342821		5/16" Split Ring Lock Washer SS	16
10	342822		Gear Reducer Housing 920 MDSN (790509)	1
11	342823		5/16"-18 x 1-1/4" Hex Head Screw SS	4
12	341797		Motor Adapter Flange (800254)	1
13	340704		Retaining Ring (10141)	1

PARTS LIST

M-Series Vacuum Pump



Parts Below Not Shown	1/2HP	3/4HP
12VDC SOLENOID	345831	345831
24VDC SOLENOID	346900	346900
32VDC SOLENOID	346530	346530
115VAC RELAY 50/60 HZ	341431	342479
220VAC RELAY 50/60 HZ	342478	342478

PARTS LIST

ITEM	PART NUMBER		DESCRIPTION	QTY
	1/2HP	3/4HP		
1	342469		3/8"-16 x 1/2" Hex Head Screw	4
2	341598		.875" x .406" x .042" Flat Washer	4
3	342422		Stainless Steel Cover	1
4	342466		Gear Reducer 920MDSN 30:1 ratio, 15 GPM	1
	342770		Gear Reducer 920MDSN 20:1 ratio, 20 GPM	
5	342454		5" Output Shaft	1
6	340689		5/16"-18 x 1-1/4" Socket Head Screw	1
7	640286		M Pump Eccentric	1
8	340720		1/4" Output Shaft Key	1
9	342413		M Pump Diaphragm Rod	1
10	342472		5/8"-18 Thin Series Nut	2
11	342759		5/16"-18 x 1-3/4" Hex Head Screw	6
12	342404		M Pump Top Closure	1
13	342405		Upper Diaphragm Plate	1
14	342419		M Pump Diaphragm	1
15	342406		Bottom Diaphragm Plate	1
16	346604		1/4"-20 Hex Nut	22
17	346615		1/4" External Tooth Lock Washer	22
18	346795		.625" x .281" x .050" Flat Washer	22
19	340687		1/4"-20 x 1" Hex Head Screw	16
20	342459		Inlet Flange, 1-1/2" Female NPT	1
	342675		Inlet Flange, 2" Male NPT	
	342757		Inlet Flange, 1-1/2" Female BSPT	
	640321		Inlet Flange, 2" Male BSPT	
21	348702		2" Duckbill Valve, EPDM (Black)	4
	342684		2" Duckbill Valve, Nitrile (Red)	
22	342456		Valve Housing	2
	342449		Valve Housing Elbow	
23	342402		M Pump Body	1
24	342403		M Pump Base Mounting Bracket	1
25	342467		1/4"-20 x 3/4" Hex Head Screw	4
26	342688		1/4" NPT Brass Plug	1
27	342462		Outlet Flange, 1-1/2" Female NPT	1
	342675		Outlet Flange, 2" Male NPT	
	342756		Outlet Flange, 1-1/2" Female BSPT	
	640321		Outlet Flange, 2" Male BSPT	
28	342468		1/2"-13 x 1-1/4" Hex Head Screw	1
29	340688		3/8"-16 x 1-1/2" Hex Head Screw	4
30	342471		3/8" Split Ring Lock Washer	8
31	341188	342771	Motor, 115/230VAC, 60Hz, TEFC	1
	340918	342465	Motor, 115/230VAC, 50Hz, TEFC	
	341765	342699	Motor, 115/230VAC, 60Hz, Explosion-Proof	
	342772	342773	Motor, 115/230VAC, 50Hz, Explosion-Proof	
	341146	342775	Motor, 12VDC	
	341127	342776	Motor, 24VDC	
	341118	342777	Motor, 32VDC	
32	340707		1PSI Pressure Vent	1
33	347773		3/8"-16 x 1" Hex Head Screw	4
34	342761		5/16" External Lock Washer	6
35	342760		5/16"-18 x 1" Hex Nut	6
36	342762		5/16" Flat Washer	6

MANUFACTURER'S ONE-YEAR LIMITED WARRANTY

SeaLand warrants to the original purchaser only, that this product, if used for personal, family or household purposes, is free from defects in material and workmanship for a period of one year from the date of purchase.

If this SeaLand product is placed in commercial or business use, it will be warranted, to the original purchaser only, to be free of defects in material and workmanship for a period of ninety (90) days from the date of purchase.

SeaLand reserves the right to replace or repair any part of this product that proves, upon inspection by SeaLand, to be defective in material or workmanship. All labor and transportation costs or charges incidental to warranty service are to be borne by the purchaser-user.

EXCLUSIONS
IN NO EVENT SHALL **SEALAND** BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, FOR DAMAGES RESULTING FROM IMPROPER INSTALLATION, OR FOR DAMAGES CAUSED BY NEGLECT, ABUSE, ALTERATION OR USE OF UNAUTHORIZED COMPONENTS. ALL IMPLIED WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE, ARE LIMITED TO A PERIOD OF ONE YEAR FROM DATE OF PURCHASE.

IMPLIED WARRANTIES
No person is authorized to change, add to, or create any warranty or obligation other than that set forth herein.

Implied warranties, including those of merchantability and fitness for a particular purpose, are limited to one (1) year from the date of purchase for products used for personal, family or household purposes, and ninety (90) days from the date of purchase for products placed in commercial or business use.

OTHER RIGHTS
Some states do not allow limitations on the duration of an implied warranty and some states do not allow exclusions or limitations regarding incidental or consequential damages; so, the above limitations may not apply to you. This warranty gives you specific legal rights and you may have other rights which may vary form state to state.

To obtain warranty service, first contact your local dealer from whom you purchased this product.

SeaLand® BRAND

Dometic®

The first choice in marine and RV sanitation.

Dometic Corporation
13128 State Rt 226, PO Box 38, Big Prairie, OH 44611-0038 USA
SeaLand Customer Service
1-800-321-9886
330-496-3211 (8:00 a.m.-5:00 p.m. ET)
Fax: 330-496-3097
www.sealandtechnology.com

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